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ALASKA AND STONER, OR "MIRACLE," WHEATS: TWO VARIETIES MUCH MISREPRESENTED.

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INTRODUCTION.

There are many named varieties of wheat and other cereal crops. New varieties and new names for old varieties are appearing constantly. Many of these new varieties, or so-called varieties, are good; some are not. The good varieties are sometimes advertised as being much better than they really are. Varieties of little value sometimes are claimed to be the best of all.

There are various ways by which the promoters of supposed new varieties interest their customers. Sometimes it is a story of wheat of mysterious or foreign origin; sometimes it is a new or unusually developed character that is claimed. Examples of this are the enormous tillering power claimed for the so-called Miracle wheat or the

wonderful productiveness claimed for the branched heads of the so-called Alaska wheat. Always, however, the yields are said to be enormous. Sometimes the same variety is exploited again and again under a new name and with a new and wonderful story.[1]

The present paper deals with two misrepresented varieties of wheat. They have had very interesting and varied histories in past years. This bulletin tells what they really are, gives the story of their origin, quotes the claims made for them, and states what they may reasonably be expected to do under average conditions.

Active efforts to promote the sale of these wheats are still being made and many farmers are being misled into purchasing them because of the plausible statements made by the promoters. The United States Department of Agriculture and the State agricultural experiment stations endeavor to keep informed concerning all such exploitations and to warn their constituents of the danger. The present paper is the result of this endeavor.

ALASKA WHEAT.

The so-called Alaska wheat is merely a very old variety under a new name. Attempts to promote it under one or another of its many names have been numerous and persistent for more than a hundred years. There is evidence that these exploitations usually have been profitable to promoters and expensive to purchasers. In order that the reader may know definitely some of the ways in which it has been promoted its history is given rather fully. Quotations from early American writers show former exploitations, while the most recent one is fully discussed. These instances should serve to put readers on guard against future exploitations. This wheat has never been proved to have value anywhere in the United States.

DESCRIPTION OF ALASKA WHEAT.

The variety recently exploited under the name Alaska wheat belongs to the poulard subspecies of wheat. Botanically, the poulard wheats are known as *Triticum turgidum* or *Triticum aestivum turgidum*. They are somewhat intermediate between the common and the durum wheats. All of them are bearded, and the beards are more or less intermediate in their length and color between those of common wheat and those of durum wheat. They have the peculiarly flattened heads, the broad chaff, and the amber kernels of the durums. The chaff, however, is rather thin and papery, and the kernels are shorter, softer, and more humpbacked than those of durum wheat.

These wheats are not grown commercially anywhere in this country, and the relationships of the different varieties are not well known.

[1] See Ball, C. R. "Three much-misrepresented sorghums," U. S. Dept. Agr., Bur. Plant Indus. Cir. 50, 14 p., 2 fig. 1910.

The chaff is usually without hairs, but sometimes it is hairy. Some have simple heads, like the common and durum wheats; others have branched heads.

The poulard variety here discussed as Alaska wheat is fairly well known in the United States. It has branched heads and no hairs on the chaff. It has been advertised many different times under many names, but has never become permanently established. On account

FIG. 1.—Large, medium, and small heads of Alaska wheat. (About half natural size.)

of the large, branching head it has always been easy to interest people in this variety. Heads of this wheat are shown in figure 1.

EARLY HISTORY OF ALASKA WHEAT.

Poulard wheat in one or another of its forms is grown to some extent in the Mediterranean region of Europe. This variety of poulard wheat with branched head has been known in this country under many different names. Among them are Alaska, Egyptian, Eldorado, Jerusalem, Many-Headed, Many-Spiked, Miracle, Multiple-Headed, Mummy, Reed, Seven-Headed, Smyrna, Syrian, Wheat

of Miracle, Wheat 3,000 Years Old, and Wild Goose. It is probable that as many more names for this variety could be found if early agricultural literature were searched.

Like many other crops, it probably was introduced in colonial days. In 1815, a letter dated 1807 and signed by John Keemle[1] was published concerning a so-called Jerusalem wheat. This was a part of a small crop produced by Dr. Keemle from seed secured by him from Ireland and sown in the fall of 1806. These statements are found in this letter (p. 137):

> Its productiveness may be estimated by the number of heads on a single straw, on some there are 3–5–7 heads, as you will observe by those I send you. The straw is 6 feet high, and very stout, sufficiently so to bear its own weight uncommonly well. The grain is full and plump, differently shaped from our wheat, and somewhat larger.

From this it is evident that the Jerusalem wheat of 1807 was identical with the Alaska wheat of the present time.

In connection with this letter the origin of the name Jerusalem is given by Dr. J. Mease,[2] secretary of the Philadelphia society. According to this statement, a small sheaf of this wheat was brought from Palestine by a traveler and used as "a sign to an alehouse which he kept for some years after in Dublin." Some seeds from this sheaf were picked up and planted by a farmer, who several years later sold the produce of several acres at about $3.65 a pound. Dr. Mease further states (p. 138):

> It is believed that the same variety of wheat was introduced into this country in 1792, as some of a kind answering to the description of the Jerusalem wheat was presented to the society, and distributed among the members, but as it has been lost it is more than probable it possessed no particular good qualities.

In the issue of the American Farmer for September 26, 1840, there is an engraving from a drawing of a head of wheat, without doubt the same as the Alaska wheat of the present time. This wheat was grown by Mr. Alpheus Baker,[3] of Abbeville, S. C., who is quoted in part as follows:

> The wheat to which you allude was brought to this place from the Osage Nation, by Col. Spieren, who had been sent to them as a commissioner by the President of the United States. * * * We sell the wheat at $5 per head.

In the same journal, in the issue of October 7, 1840, Mr. Gideon B. Smith,[4] of Baltimore, Md., writes as follows:

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[1] Keemle, John. On Jerusalem wheat. *In* Mem. Phila. Soc. Prom. Agr., v. 1, p. 135–137. 1815.

[2] Mease, James. On Jerusalem wheat. *In* Mem. Phila. Soc. Prom. Agr., v. 1, p. 137–138, 1815.

[3] Baker, Alpheus. [A new wheat.] *In* Amer. Farmer, n. s., v. 2, no. 19, p. 148, 1 fig. 1840.

[4] Smith, Gideon B. The new species of wheat. *In* Amer. Farmer, n. s., v. 2, no. 20, p. 154. 1840.

THE NEW SPECIES OF WHEAT.

BALTIMORE, *October 3, 1840.*

To the EDITOR OF THE AMERICAN FARMER.

SIR: I think it proper to take the earliest occasion to notice the new species of wheat, a drawing of which has just been published in the American Farmer and copied into the American and Patriot, accompanied by a letter from Mr. Read. I do this for the double purpose of saving money and trouble to all concerned. This new species of wheat is, without doubt, the Egyptian wheat *Triticum compositum*, for a drawing and description of which, see Loudon's Encyclopedia of Plants. The engraving in Loudon and that in the Farmer present the same characters precisely. Besides, I have often seen the Egyptian wheat, and the head of the new species which has been exhibited to me is identical with the Egyptian. This kind of wheat was introduced into England in 1799, and from that time to the present has made frequent appearances in the United States. It has been called successively the Egyptian, Syrian, Many-spiked, Seven-headed, Reed, Wild Goose wheat, etc. The name Wild Goose was given to it from the fact that a few grains of it were found some years ago in the crop of a wild goose that was killed on the shores of Lake Champlain. The name Reed wheat was given to it because of its stout stem resembling a small reed or cane. It was received by the Philadelphia Society for Promoting Agriculture, in 1807, from Gen. Armstrong, then our minister at Paris. Judge Peters took charge of a part of it, and grew it five or six years. It was at first very productive under his cultivation, a pint of seed sown in drills and hoed producing one bushel and a peck of grain. But after the first three or four years, the Judge says it did not thrive sufficient to authorize extensive cultivation. At that time it was extensively distributed by the above-named society. Judge Buel says he had seen extensive fields of it.

In the Domestic Encyclopedia, published in 1821, it is stated that the Egyptian wheat does not yield as much flour as any of the other kinds, and that the flour is scarcely superior to that obtained from the finest barley. In March, 1838, it was selling in Albany, N. Y., at $5 per bushel. It has several times been brought from Santa Fe by travelers and traders. It appears to be cultivated in that country, probably owing to its better adaptation to the climate than other kinds. That the Osage Indians might have obtained it from Santa Fe is no way improbable. How it found its way from Egypt to Santa Fe I cannot pretend to guess, unless a wild goose also carried it from the former to the latter country, which, on reflection, is scarcely more improbable than the fact stated above, that one of these birds carried it to the shores of Lake Champlain.

From all these facts it would appear that if the wheat in question had been adapted to our climate, or was susceptible of acclimation, and in other respects a good variety, it would have gone into general cultivation long before this time, as I take it for granted that an article that had been so extensively distributed and so thoroughly experimented upon would have been retained and universally cultivated, if it had been found valuable. During the 20 years of my agricultural experience it has been presented to my notice at least 20 times.

Your obedient servant,

GIDEON B. SMITH.

The names Egyptian, Miracle, Mummy, and Wheat 3,000 Years Old all are derived from one of the most common untrue stories about this variety. The story varies somewhat in detail but in gen-

eral it tells that when the coffin of an Egyptian mummy 3,000 or 4,000 years old was opened, some wheat was found. Seed was planted, but only a single kernel grew. The resulting plant proved a wonderful yielder and very different from any wheat now known.

Of course, this story in all its forms is a fabrication, pure and simple. Stored under most favorable conditions, seeds of wheat will not keep their vitality more than a few years. No wheat thousands of years old has ever been known to germinate.

The name Egyptian wheat has recently been used in exploiting a very different crop, namely, a variety of sorghum properly known as shallu.[1] The name Miracle has been recently used for an entirely different kind of wheat. The name Wild Goose has been used also for Arnautka durum wheat and for Polish wheat.

It always has seemed easy to interest people in this wheat. The branched head and the mummy, wild-goose, and other stories have been the very profitable stock in trade of many a promoter. It seems very natural to many people that if an unbranched head will yield so much, a branched head should yield much more. Head for head, this may sometimes be true, but acre for acre it is not, as shown by the results of experiment. The wheat is not grown commercially anywhere in this country, and ought not to be until it is shown to possess better qualities than are known at present.

RECENT EXPLOITATION OF ALASKA WHEAT.

In the early summer of 1908 accounts of what was claimed to be a wonderful new wheat appeared in the press. These set forth in brief that in 1904 an Idaho farmer had found, in a secluded spot on the Alaskan coast, a wheat plant with branched heads. They further stated he had brought back one head and sowed its seed that fall, increasing the quantity to 7 pounds in 1905 and to 1,545 pounds in 1906, the latter being an increase of 220 fold, from which it was argued that sowing 1 bushel to the acre would produce 220 bushels.

One of the statements about the wheat which awakened much interest in the Eastern States was al follows:[2]

> And, last and best of all, it will bring back wheat raising to the worn-out farms of the East, where, with wheat yields 200 bushels to the acre, farmers can afford to use manures and chemicals and make a profit.

There was obtained soon after a well-illustrated advertising circular containing exaggerated and misleading statements regarding the origin of the wheat, its yielding power, its milling value, its drought and cold resistance, its adaptability to poor soils, etc. This

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[1] Ball, C. R. Three much-misrepresented sorghums. U. S. Dept. Agr., Bur. Plant Indus. Cir. 50, 14 p., 2 fig. 1910.

[2] Day, O. F. G. A miracle in wheat. *In* Sat. Even. Post, v. 181, no. 7, p. 11. 1908. The assertions made in this article were later disavowed by the paper. (Editorial, Sat. Even. Post, v. 181, no. 11, p. 16. 1908.)

bore the name of a seed-grain company in Juliaetta, Idaho, which offered a limited supply of the seed at $20 per bushel.

The following quotations from this circular contain the claims made for the origin, character, yield, and value of the Alaska wheat:

THE BIRTH OF ALASKA.

Alaska wheat is the result of a bright idea on the part of Abraham Adams, an Idaho farmer, who realized the possibilities of a "double" wheat crop if it could be perfected. After working several years he perfected a head of wheat with one single central head, around which were nine other shorter heads. If this head would repeat in the planting, it meant a crop six to ten times greater than ordinary wheat.

The double head was planted in the fall of 1904, and the next summer 7 pounds resulted, and every head was double.

The 7 pounds planted in the spring of 1906 brought forth 1,545 pounds, 222½ times the plant made, or, at 1 bushel plant to the acre, 222½ bushels to the acre.

THE ALASKA WHEAT REVOLUTION.

It means that it is made possible to increase the wheat yield of the country tenfold when Alaska seed is plenty. It means that with Alaska wheat the farmer with a hundred acres finds his acreage value increased to a thousand acres.

Farmers in the winter-wheat countries will have a winter wheat that will be hard wheat instead of soft.

The worn-out farms of the East can again raise wheat, because with such a yield farmers can afford to use fertilizer and get valuable returns.

Farmers in dry countries will find in Alaska wheat an ideal wheat for dry land, where it flourishes, because its native spot was dry.

Farmers in hot countries will find a wheat that remains cool and green after two weeks of dry weather with the thermometer at 140° in the fields.

Farmers in cold countries will find a wheat that resists frost and hail that would ruin any other wheat.

ALASKA'S YIELD.

Regarding the trial of Alaska, a hundred bushels to the acre is only a small yield. It has run from 100 bushels to 222½ bushels to the acre in large tracts, and even more in favored places. Like all wheat, much will depend on the soil; the better the soil the larger the yield.

From correspondence with the promoter of the wheat, it is known that in the spring of 1908 samples of seed were sent to a chemist for analysis. The report of this analysis, submitted in May, 1908, was favorable to the wheat. Without making a milling test, the chemist reported that probably it would be as good as, if not superior to, Palouse Bluestem for flour-making purposes.

The United States Department of Agriculture early in June, 1908, began an investigation of the exploiting of this wheat. A warning statement, issued on August 18 following, was widely distributed. At the same time a cereal expert in the department was instructed to study the wheat in the Idaho fields and report on the yields obtained.

At Juliaetta, on September 4 and 5, 1908, the expert found about 700 acres of this wheat being grown for the seed company. The wheat in different fields was then being thrashed and was found to be yielding from 10 to 35 bushels per acre. The average was estimated to be about 25 bushels. Well-known wheat varieties of the Pacific Northwest were yielding as much and more under identical conditions. It was found that good farmers around Juliaetta were not growing this wheat.

This accords with a statement made by the promoting company in a later pamphlet to the effect that the farmers refused to rent their summer fallow for the growing of this wheat, and the promoters were obliged, therefore, to sow it on continuously cropped land.

Orders and remittances for the seed wheat were being received in large numbers. Most of the wheat was being shipped in bushel and half-bushel lots to farmers of the New England and Atlantic States. It will be remembered that the wheat had been advertised as having especial value for eastern conditions. An agent was spending his entire time taking orders in the South. Very little was found to have been sold in the Northwest. Many telegrams canceling orders were also being received, probably as a result of the press notice given out by the United States Department of Agriculture and of the disclaimer published by the paper which contained the original article.

A widespread controversy immediately arose concerning the identity and value of the so-called Alaska wheat. Those who had seed for sale claimed that it was a wheat of wonderful producing power. State and Federal investigators reported it to be nothing more or less than the old Egyptian or Seven-Headed wheat under a new name. Chemical analyses and milling and baking tests were made at several places, with results unfavorable to the flouring value of this wheat.

The Post Office Department in 1908 took account of the doubtful nature of the advertising matter being circulated and issued a fraud order against the promoting company.

In 1909, however, another campaign was begun in favor of the wheat. Various press items appeared contradicting the conclusions of the chemists and millers. It was claimed that the wheat was just as good for milling and baking purposes as the Palouse Bluestem or any other wheat. A 12-page pamphlet was published by the promoting company, discussing the controversy which had arisen over the value of the wheat. Extracts from Idaho Agricultural Experiment Station Bulletin No. 65, issued in November, 1908, are included in this pamphlet.

Extracts from letters said to have been written by several well-known agronomists of the country are frankly included also, although unfavorable to the wheat. Their opinions may be summed up in these quotations:

Farmers are warned to avoid this wheat as they would a pestilence.

It is one of the poorest wheats known for flour-making purposes, and it is never grown where ordinary varieties of wheat will thrive.

Not even good for stock feed.

Shun it as you would the smallpox.

Warning against what I must now recognize as a brazen fraud.

The illustrations in this pamphlet are exactly the same as those in the original advertising circular. Some of the statements contained in the previous circular are repeated, and in addition affidavits from growers, thrashers, and others are included. The only figures in this circular from which a yield per acre can be determined are to the effect that on one field, in 1908, 501 sacks were thrashed from 30 acres. Assuming that these sacks contained the usual 2¼ bushels each, this yield would be only 37½ bushels per acre. It is stated also that the 1,545 pounds grown in 1906 yielded 53,000 pounds in 1907. The acreage is not given, but this is an increase of only 35 fold. A greatly increased acreage was harvested in 1908, but the acre-yields are not given. In the pamphlet the price is still given as $20 a bushel, for sale by a certain seed grain company.

Little more public attention was attracted to the Alaska wheat until the spring of 1915, when it was placed on exhibition by the promoter at the Panama-Pacific Exposition. Visitors at the exhibit were invited to take a copy of the pamphlet just discussed. It had been provided with a new cover, the last leaf of which is so pasted on as to cover the name of the seed grain company and the quoted price of $20 a bushel. The front cover announces that Alaska wheat, "smut proof" and a "big yielder," is for sale by the promoter at Juliaetta, Idaho.

Early in 1915, also, still another exploitation of this wheat seemed to be getting under way. This time a Wyoming association offered the seed under the name of Egyptian Seven-Headed Wheat. The price was $10 a bushel.

YIELDS OF ALASKA WHEAT.

An agent of the United States Department of Agriculture visited the field of Alaska wheat being grown in the vicinity of Juliaetta, Idaho, in 1908. There were about 700 acres in all. The yields were found to vary from 10 to about 35 bushels to the acre, the average yield being about 25 bushels. Other varieties, growing under conditions apparently identical, were yielding as much and more.

Regarding the yield of Alaska wheat, this statement is made by French and Jones.[1]

> The yields this season, 1908, have not been phenomenal in any way. In some cases the wheat was quite badly mixed with other varieties, such as Canadian Hybrid and Little Club. An estimate of the yield, verified in some cases by the thrashing-machine record, is from 20 to 40 bushels per acre. This is about the same yield as obtained from ordinary winter wheat this season. That it will exceed these yields when grown under field conditions remains to be proven.

Alaska wheat has been frequently tested in rows and small plats in several States in different sections of the country by the United States Department of Agriculture in cooperation with the respective State experiment stations. The results of some of these tests are here reported.

At Akron, Colo., when sown in 20-foot rows in the spring of 1909, two tests of Alaska wheat gave yields at the rate of 14 and 11 bushels per acre, respectively. There were 82 rows in the nursery of this year, exclusive of checkrows, consisting of many different varieties and strains. Of these, 69 yielded at rates in excess of 14 bushels per acre, the best of the Alaska yields.

In 1912 Alaska wheat was again tested at Akron in 20-foot rows and yielded 5.5 and 11.5 ounces per row, respectively, in two tests. There were in this year 114 rows in the nursery, exclusive of check rows, consisting of many varieties and strains. Of these, 28 yielded more than 11.5 ounces per row, the best yield of the Alaska wheat.

In 1913, at Akron, Alaska wheat was tested in nine rows, each about a rod in length. It varied in yield from 2 to 9 ounces per row, with an average of 5.8 ounces. There were no less than 60 rows of several varieties, out of more than 600 rows grown, that yielded more than 9 ounces, the best yield of the Alaska, and a great many more that yielded better than the average. In 1914, Alaska wheat again gave about an average yield in row tests at Akron.

When sown in short rows at Williston, N. Dak., in the spring of 1909, Alaska wheat was one of the poorest yielding varieties among the many durum and common kinds tested. It was so poor that it was not continued.

When sown in a 60-foot row at Belle Fourche, S. Dak., in the spring of 1912, Alaska wheat yielded about the amount of seed sown and was not continued.

When sown in rows a rod long at Cheyenne, Wyo., in the spring of 1913, Alaska wheat yielded a little more than the seed sown, or at the rate of about 1⅛ bushels per acre. A common spring variety

[1] French, H. T., and Jones, J. S. Alaska wheat investigation. Idaho Agr. Exp. Sta Bul. 65, p. 6. 1908.

yielded in a similar test about 7 bushels per acre. In 1914 at this place on a plat containing 1/142 of an acre it yielded at the rate of 18.9 bushels per acre, while Fife and bluestem wheats yielded at the rate of 8.3 and 9.5 bushels per acre, respectively, in similar tests.

At Chico, Cal., in 1912, out of 57 selections tested, Alaska wheat ranked forty-third.

In the Judith Basin, Mont., Alaska wheat was sown in the fall of 1908, but winterkilled.

These results, meager as they are, indicate that Alaska wheat is not a valuable wheat in respect to yield in many parts of the central and western United States.

Alaska wheat has been tested for several years in short rows at the Arlington Farm, at Rosslyn, Va., and has done very poorly there. It has never yielded much more than the seed sown and has usually yielded less than this quantity. It is clearly not a valuable wheat for the eastern part of the United States.

Alaska wheat has usually proved a total failure or has given poor results when it has been tried in a small way at the various stations of the United States Department of Agriculture. This and its known inferiority as a milling wheat are responsible for its not being sown in the plats along with other varieties that are being tested. Usually only the better wheats are included in such tests.

This wheat, either under its present name of Alaska or under some of its earlier names, has doubtless been tried on many types of soil in many parts of the United States in the course of the last century. That it has never become established indicates apparently that it is not a valuable variety under any of the conditions where it has been grown. It has remained for promoters to resurrect it time and again and, aided by its striking and unusual appearance, to sell it to the unwary at exorbitant prices. Agricultural literature abounds in instances of this deception.

MILLING TESTS OF ALASKA WHEAT.

Regarding the tests made at the Idaho station,[1] it may be said that milling and baking tests were made of wheat "secured at the warehouse in Juliaetta from the spring and winter Alaska wheat stored there" and of a good grade of Little Club wheat. Without going into details regarding these tests, the following quotation indicates what results were secured:

> The results uniformly bear out the laboratory experience that there is very little difference in the baking qualities of flour obtained from the Little Club wheat and that obtained from the Alaska wheat. The Little Club is a soft wheat grown extensively in this part of the State, both as a spring and winter

[1] Data from the following: French, H. T., and Jones, J. S. Alaska wheat investigation. Idaho Agr. Exp. Sta. Bul. 65, 12 p. 1908.

wheat; for milling purposes it would probably be placed about halfway between the best and the poorest milling wheats. We understand that it is considered a good mixer by commercial millers and doubtless much of it is milled accordingly. It should be remembered that all the work mentioned was done upon wheat of this year's crop. It is possible that if samples representing these same lots were taken and ground three months from now and the flour so obtained compared in the same way, more decided differences might be revealed.

A bushel of the Alaska wheat was secured from Mr. Adams's ranch, in 1908, and forwarded to the Grain Standardization Laboratory of the United States Department of Agriculture at Fargo, N. Dak., where it was milled at the experimental mill at the North Dakota Agricultural College. Mr. L. A. Fitz, assistant in grain standardization, reported the results as follows:

A baking test of the three grades of flour obtained was made two days after milling and this was followed by a second test after the flour had aged three weeks. A "standard" or "check" loaf was baked from a hard red spring-wheat flour each day to compare with the particular flour being tested. In all cases 340 grams of flour were used, and the amount of water used was regulated by the absorptive ability of the flour. The same amounts of sugar, salt, and yeast were used in all cases.

The results of the milling tests were as follows:

Laboratory sample No. 243 of Alaska wheat, milled November 10, 1908.

Weight per bushel:		Bran ---------- per cent--	9.74
Before cleaning---pounds--	59.5	Shorts ---------- do----	19.48
After cleaning, scouring, and tempering--pounds--	51.5	Total flour ---------- do----	70.78
Quantity milled ---------- do----	60.0	Wheat per barrel of flour:	
Loss in milling------per cent--	.53	Bushels ----------	4
		Pounds ----------	38

Of the total flour 54.14 per cent was patent flour, 38.76 per cent was first-clear flour, and 7.10 per cent was second-clear flour. This wheat was tempered with water and steam just before grinding. It milled rather peculiarly, reducing to middlings very easily, but was slow to pulverize to flour.

In comparison with the data just given, 16 samples of hard red spring wheat gave the results shown in Table I.

TABLE I.—*Milling test of hard red spring wheat.*

Sixteen samples.	Flour (per cent).		Wheat per barrel of flour.	
	Total.	Patent.	Bushels.	Pounds.
Maximum	75.64	78.41	5	0
Minimum	69.99	63.52	4	23
Average	73.22	74.30	4	34.5

The baking tests of Alaska wheat gave the results shown in Table II.

TABLE II.—*Baking report on sample of Alaska wheat.*

Date and mark.	Water used.	Loaf.		Color.	Texture.	Remarks.
		Weight.	Volume.			
Nov. 12, 1908:	*C. c.*	*Grams.*	*C. c.*	*Per cent.*		
Standard patent	185	459	2,433	97	Good	Grayish.
Alaska—						
Patent	162	427	1,049	99	Poor	
First clear	172	439	1,195	91	...do	Dull and ashy.
Second clear	180	455	1,098	82	...do	
Dec. 2, 1908:						
Standard patent	184	475	2,368	100	Good	
Alaska—						
Patent	183	473	1,155	99	Poor	Dull.
First clear	196	488	1,320	91	Fair	
Second clear	209	498	1,270	82	...do	

The test on November 12 showed that the water absorption was lower, the weight was less, and the volume of loaf was less by half than that of hard spring patent. The color and texture were both quite poor. The test made on December 2 merely showed the improvement which was to be expected as the result of aging.

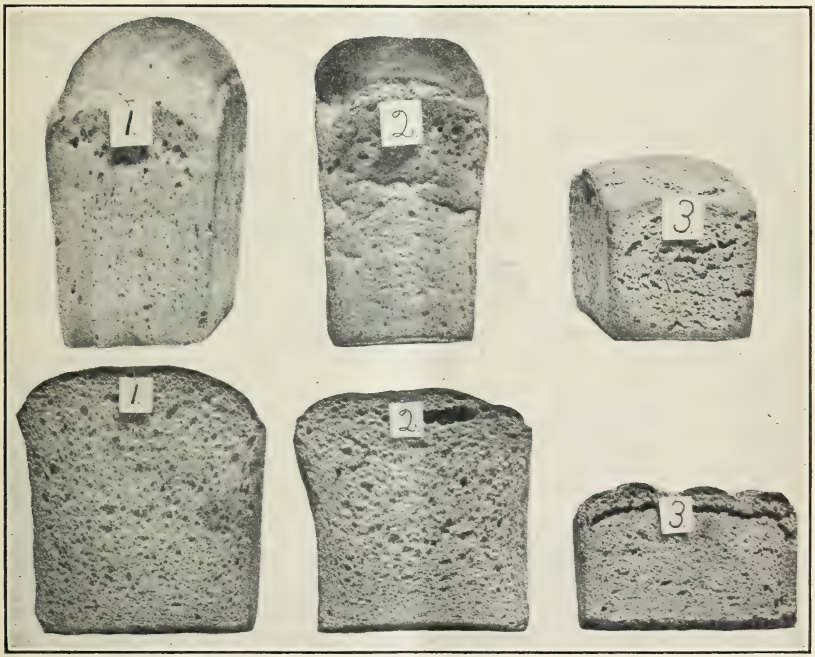

FIG. 2.—Whole loaves (above) and cut loaves (below) baked from patent flours: 1, "Standard," from hard spring wheat; 2, from durum wheat; 3, from Alaska wheat.

Photographs of the loaves obtained in the first baking aid in interpreting the data given. Figure 2 shows whole and cut loaves baked from the patent flour of (1) hard spring wheat, (2) durum wheat, and (3) Alaska wheat. The hard spring loaf is used as the

standard for comparison. Figure 3 shows whole and cut loaves baked from (1) durum first-clear flour, (2) durum second-clear flour, (3) Alaska first-clear flour, and (4) Alaska second-clear flour.

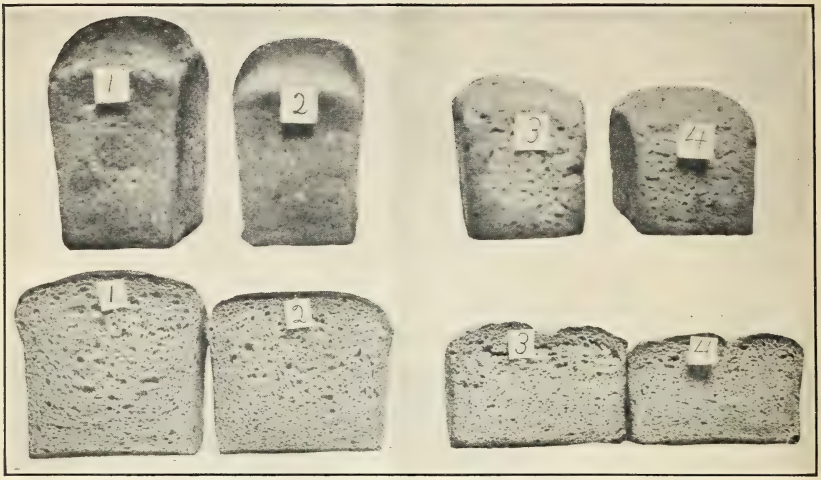

FIG. 3.—Whole loaves (above) and cut loaves (below) baked from first-clear and second-clear flours: 1, First-clear flour from durum wheat; 2, second-clear flour from durum wheat; 3, first-clear flour from Alaska wheat; 4, second-clear flour from Alaska wheat.

The results of these tests show that Alaska wheat is clearly not in the same class and does not deserve to be compared with the hard red spring, the hard red winter, or the durum wheats. The reason for this becomes more apparent on considering the results of the chemical analyses given in Table III.

TABLE III.—*Chemical analyses of flour made from Fife, bluestem, and other wheats, compared with flour made from Alaska wheat.*

Kind of wheat.	Samples averaged.	Patent flours.			First-clear flours.			Second-clear flours.		
		Protein (N×5.7).	Gliadin (N×5.7).	Proteins as gliadin.	Protein (N×5.7).	Gliadin (N×5.7).	Proteins as gliadin.	Protein (N×5.7).	Gliadin (N×5.7).	Proteins as gliadin.
				P. ct.			*P. ct.*			*P. ct.*
Fife and bluestem	12	12.00	6.70	56.06	12.92	6.95	53.865	13.71	7.10	51.17
Durum	13	11.33	6.58	58.35	12.61	6.77	53.98	13.23	6.97	52.91
Preston and winter wheats	4	9.60	5.55	58.80	11.03	5.84	53.105	11.16	5.89	53.19
Alaska		7.64	3.99	52.24	8.72	4.39	50.313	9.75	4.61	47.39

STONER, OR "MIRACLE," WHEAT.

In the last 10 years a variety of wheat has been widely advertised in the United States under the name "Miracle" wheat. Some very valuable characters have been claimed for it, and for that reason its history, characters, and value, as determined from experiments, are presented in this paper.

The name Miracle is undesirable, so the Department of Agriculture has named this variety Stoner, after the man who first grew it. Other names that have been applied to it are Eden, Forty-to-One, and Marvelous. This is not the only wheat variety that has been called by the name Miracle. Curiously enough, that name has been applied also many times during the last century to the Alaska wheat.

DESCRIPTION OF STONER, OR "MIRACLE," WHEAT.

The wheat here discussed is a variety belonging to the soft red winter wheats. This is the class of wheat commonly grown in the eastern United States from the Atlantic coast to the Mississippi River and beyond. The Stoner wheat has bearded heads (fig. 4), white, hairless chaff, and a medium-sized, rather soft, red kernel. This shows it to belong in the group with Bearded Purple Straw (fig. 5) and Fulcaster (fig. 6), both well-known varieties in the Middle Atlantic States. It grows from 3½ to 4½ feet tall, according to soil and season. It ripens at about the same time as these two varieties which it so closely resembles. Heads of all three varieties are shown in figures 4, 5, and 6. The Stoner (Miracle) wheat is a pure strain; that is, it is descended from a single plant.

HISTORY OF STONER, OR "MIRACLE," WHEAT.

The strain of wheat now known as Stoner originated on the farm of Mr. K. B. Stoner, of Fincastle, near Roanoke, Va. It was first brought to the attention of the United States Department of Agriculture through a letter from Mr. Stoner,[1] dated June 8, 1906.

In the spring of 1904 Mr. Stoner noticed a large bunch of grass in his garden; when headed it proved to be wheat. It had 142 stems, or tillers, and he became impressed with the idea that it was a very wonderful wheat. Just how the kernel of wheat became sown in the garden or from just what variety it came, Mr. Stoner does not know. The Fulcaster variety is commonly grown in that section of Virginia, however, and the Bearded Purple Straw less commonly. It is reasonable to suppose, therefore, that the Stoner wheat is a pure line from one of these varieties, which it so closely resembles.

Mr. Stoner saved the seed and increased it during the two years 1905 and 1906, as shown in his letter. He stated that while he could have his wheat grown at Fincastle on shares, he receiving two-thirds,

[1] In the year 1904 there originated with me a plant of wheat, producing more than a thousandfold. The product of this single grain twice sown (in the years 1904 and 1905) will this harvest (1906), we think, yield sufficient to sow much more than 100 acres. The yield (I suppose) is unprecedented in this or any other country, and for that reason difficult of belief. Possibly this wheat may enable us to successfully compete with the Canadian yield; surely so, if we can grow 2 bushels to their 1.

The drought injured wheat here, but I have single grains showing a thousandfold, and some near twice that. I think the wheat capable of exceeding 100 bushels to the acre, and think experiments made show that not more than a half bushel should be sown to the acre. The mistake so far has been oversowing.

he wished to get a foothold in Kansas and Iowa as soon as possible. He further asked that an expert be sent to see the wheat and advise regarding its propagation.

The following three chief claims were made for this wheat by the introducer in his various letters of 1906 and in the years following:

(1) That it would outyield any other variety anywhere.

(2) That it tillered more freely; that is, that it sent up more stems from one seed than any other variety of wheat.

(3) That 20 pounds of seed to the acre was enough to produce maximum yields, while other varieties required 8 pecks (120 pounds).

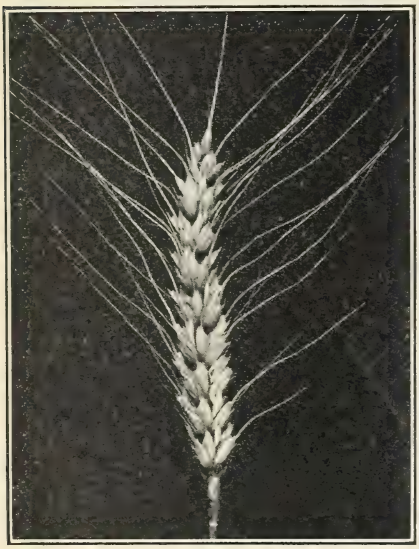

FIG. 4.—Representative head of Stoner, or "Miracle," wheat. (About half natural size.)

FIG. 5.—Representative head of Bearded Purple Straw wheat. (About half natural size.)

In the fall of 1907 an agent of the department visited Mr. Stoner's farm. The visit occurred after harvest, however, and only the stubble field and shocks could be seen. The agent reported that this wheat had been grown in the field for two seasons, but not many definite facts about its value could be obtained.

The report states that "on one farm the yield was 27.5 bushels per acre, which was 3 to 5 bushels more per acre than that of other varieties on the same farm." * * * The Miracle wheat was sown at the rate of only 3 pecks, however, while the other was sown at the rate of 8 pecks per acre. A single test in a single year on different fields, with a difference of 5 pecks per acre in the rate of seeding, is inconclusive.

The report states further that when sown in fields at the 3-peck rate, from 8 to 15 heads were produced on each plant, while the

widely spaced plants in the breeding nursery each produced from 10 to 50 heads. In any case the number varied with the rate of seeding and the fertility of the soil, which is true of all wheats.

EXPLOITATION IN PHILADELPHIA.

Mr. Stoner's desire to have his wheat grown on a large scale in the Mississippi Valley has been noted already. He expected to have about 800 bushels from the harvest of 1907. At some time in the summer of that year a Philadelphia promoter undertook the handling of the wheat and Mr. Stoner wrote to the United States Department of Agriculture that he now could get all the money necessary to promote the growing of his wheat on a large scale.

FIG. 6.—Representative head of Fulcaster wheat. (About half natural size.)

The plan first proposed by this promoter was to lease a farm in Texas and increase the supply of seed rapidly. It seems that this plan was not carried out.

In the early spring of 1908 the promoter organized a company to exploit this wheat, and a 20-page illustrated circular was issued. Plausible in most of its language, the circular contained several erroneous statements. For instance, it contained what was said to be the report of the Government agent who inspected the fields of Stoner (Miracle) wheat. The language was so changed, however, as to alter entirely the meaning of the report. The statement that in one field the Miracle wheat had yielded from 3 to 5 bushels more than other varieties on the same farm was made to read "two to three times the yield of other varieties." In like manner the figures for the average number of heads to each plant in the field and in the breeding nursery were greatly exaggerated.

The plan proposed in this circular was to place the wheat with responsible farmers in each county of the wheat-growing States. The farmer receiving the seed was supposed to contract (1) to deposit $5 for each bushel received, (2) to grow it exclusively for the promoting company, and (3) to receive $1.25 per bushel for all that he grew and also the return of his original deposits. The wheat was thus to be increased during the two years 1909 and 1910 and then

sold in foreign countries, according to the pamphlet. It does not appear, however, that any part of this plan was followed.

PROMOTING "MIRACLE" WHEAT IN CHICAGO.

In the summer of 1908 the financial interest in this wheat seems to have been transferred from the Philadelphia exploiting company to a grain company in Chicago. The details of this transaction are not known, though press items appearing on July 30, 1908, stated that Mr. Stoner had sold the rights to his wheat to western purchasers for a large sum of money and that the wheat would be sown the next season in the great wheat-producing States of the West.

The stated intention of growing this wheat in the West seems to have been carried out at this time, for in the fall of 1908 a controversy developed between the grain company and State officials in Kansas over the merits of the wheat. Nothing further has been heard of this company in connection with this wheat.

PROMOTING "MARVELOUS" WHEAT IN INDIANA.

In 1908 Mr. Stoner sold a quantity of his wheat to a seed company in Indiana. By them it was renamed "Marvelous" wheat and advertised in extravagant terms as a wonderful variety. This company is still advertising the Stoner wheat under the name given above.

PROMOTING "MIRACLE" WHEAT IN BROOKLYN.

In the summer of 1911 an organization in Brooklyn began advertising Miracle wheat at $1 a pound in its own publication. Two or three years previously it had quoted a portion of the pamphlet published by the exploiting company of Philadelphia.

In the summer of 1912 this organization issued a four-page special publication, of full newspaper size, the entire first page of which was an advertisement of the wonders of Miracle wheat and spineless cactus. The headlines read: "Spineless cactus—Miracle wheat—Millionaires and vast irrigation schemes are Bible propositions." The seven columns of text were to the effect that these two crops are creations in fulfillment of biblical prophecy. By means of an enormous irrigation project, financed by Wall Street millionaires, all the arid West was to be converted into vast fields of wheat and cactus.

THE STONER SEED WHEAT COMPANY.

During these years when various organizations were exploiting this wheat, the introducer continued to sell seed. There is no reason to think that he had any connection with any of these organizations.

In June, 1911, he published an illustrated advertising booklet to increase the demand for the seed. Testimonials from 12 growers are printed therein, but only one gives an actual yield from a piece of

ground of stated size. That one got 12 bushels from a half acre, or at the rate of 24 bushels to the acre. Part of the others tell what they think their wheat will yield. The rest tell what their 2-pound and 4-pound lots yielded without stating the size of the plat on which these were sown.

The statement is repeated that this wheat will yield more when sown at the rate of 2 or 3 pecks per acre than when sown at 8 pecks, or than other wheats will yield when sown at the usual rate. References are made to the size of the plants and the large number of grains produced by them when widely spaced in the nursery. Definite statements that prove in any way the superior value of the wheat was not found in the pamphlet.

The pamphlet states that previously the wheat had been selling at the rate of $1.25 a pound, with 4 pounds the largest quantity sold to any one person. At this time, however, the price was reduced to $5 a bushel.

In recent correspondence Mr. Stoner has stated that during 1911 and 1912 the demand for the seed was not very large. He states further, however, that interest in the crop is increasing rapidly and that during the last two seasons sales have been numerous. Previously much of the crop had been milled for lack of a demand for it as seed wheat.

Mr. Stoner still claims that his wheat is a superior yielder. He still claims that it will make better yields from thin seeding than other wheats will from thick seeding. He even advises using less than a peck of seed to the acre and closing each alternate seed tube in the drill.

EXPERIMENTAL DATA ON STONER (MIRACLE) WHEAT.

The Stoner (Miracle) wheat has been tested at several of the State experiment stations and by the United States Department of Agriculture. These tests have been made in comparison with other varieties, and the best approved methods have been used without favor or bias. Actual yield tests in comparison with other varieties, tests of the effect of different rates of seeding, and tests of the tillering of the variety are therefore now available.

YIELDS OF STONER WHEAT IN COMPARISON WITH OTHER VARIETIES.

TESTS AT THE MARYLAND AGRICULTURAL EXPERIMENT STATION.[1]

At the Maryland Agricultural Experiment Station the Stoner (Miracle) wheat has been tested since 1912, in cooperation with the United States Department of Agriculture, in one-twentieth acre plats, with the results shown in Table IV.

[1] For further data concerning the tests made at College Park, Md., and at Arlington Farm, Rosslyn, Va., see Stanton, T. R., Cereal Experiments in Maryland and Virginia, U. S. Dept. Agr., Bul. No. 336, 52 p., 6 fig. 1916.

TABLE IV.—*Yield of Stoner (Miracle) wheat tested at College Park, Md., at different rates of seeding, in comparison with other varieties seeded at the rate of 6 pecks per acre.*

Crop year.	Yield per acre of Stoner wheat at different rates of seeding.				Best yield obtained from other varieties.	Number of varieties tested.	Rank of best plat of Stoner wheat.
	2 pecks.		6 pecks.				
	Grain.	Straw.	Grain.	Straw.			
	Bushels.	*Pounds.*	*Bushels.*	*Pounds.*	*Bushels.*		
1912	22.67	4,540	27.87	5,740	29.20	52	5
1913	12.53	1,948	16.20	1,988	28.33	42	34
1914	34.23	3,686	32.33	3,740	41.87	41	31
Average	23.14	3,391	25.47	3,823			

From the data given in Table IV it is seen that better yields of grain were obtained from the 6-peck seeding in two years out of three, and the average for the three years is 2.33 bushels larger for the heavier seeding. The 6-peck per acre seeding has resulted in the better yield of straw for each year of the test. It is further seen that Stoner (Miracle) wheat is not as good a yielding wheat as many others that are being grown. In the year 1912, when it did best, compared with other varieties, it was fifth in yield among the 52 varieties tested and fell behind the best variety 1.33 bushels. In 1913 it was thirty-fourth among the 42 varieties tested, and in 1914, thirty-first among the 41 varieties tested.

TESTS AT ARLINGTON FARM.

Tests similar to those made at the Maryland Agricultural Experiment Station have been made at the Arlington Farm, Rosslyn, Va., by the Office of Cereal Investigations of the United States Department of Agriculture. The wheat used in these tests was developed from a small amount of seed presented to the office by Mr. K. B. Stoner in 1907. The tests here have been carried on for four years, 1911 to 1914, inclusive. The varieties were grown in one-tenth or one-twentieth acre plats and were seeded at the rate of 6 pecks per acre. The results are shown in Table V.

TABLE V.—*Yield of Stoner (Miracle) wheat tested at Arlington Farm, Rosslyn, Va., in comparison with other varieties in similar plats.*

Crop year.	Yield per acre of Stoner wheat.	Best yield obtained from other varieties and strains.	Number of varieties and strains tested.	Rank of Stoner wheat.
	Bushels.	*Bushels.*		
1911	25.20	32.30	34	11
1912	30.17	37.17	37	16
1913	22.00	34.70	41	18
1914	32.30	38.20	36	6
Average	27.42			

It is seen from the results here presented that this wheat has never ranked better than sixth in yield, and was then 5.9 bushels under the best variety tested. It has always ranked among the better half, but only once among the best fourth of the varieties tested.

The 30 varieties and strains with which the Stoner (Miracle) wheat has been compared during the entire four years it has been grown, 1911 to 1914, inclusive, in the plat tests at Arlington Farm and the yields of these are shown in Table VI. Varieties that have not been grown in these comparative tests for the entire four years are omitted from the table. The varieties are arranged in the table according to average yield for the four years. It is here shown that this wheat has ranked tenth in the 31 kinds in average yield for this period, and has yielded 6.55 bushels less than the best variety.

TABLE VI.—*Yield of the varieties of winter wheat grown each year at Arlington Farm, Rosslyn, Va., 1911 to 1914, inclusive.*

C. I. No.	Variety.	Yield per acre (bushels).				
		1911	1912	1913	1914	Average.
1915	Purple Straw	25.80	37.17	34.70	38.20	33.97
1733	Dawson Golden Chaff	24.80	36.00	25.80	35.20	30.45
1957	Purple Straw	31.30	33.08	24.20	30.80	29.84
1945	Lancaster	28.80	29.08	26.50	33.30	29.42
1979	Poole	24.30	31.92	26.60	29.20	28.00
1744	Genesee Giant	20.30	30.67	28.40	32.50	27.97
1912	Missouri Bluestem	28.60	32.08	22.50	28.70	27.97
1942	Bearded Winter Fife	26.60	36.42	24.90	23.30	27.80
1930	Rocky Mountain	25.80	31.50	26.20	26.30	27.45
2980	Stoner (Miracle)	25.20	30.17	22.00	32.30	27.42
1949	Maryland Flint	32.30	29.08	23.50	23.70	27.14
1923	Fultz	25.20	31.22	22.70	29.10	27.05
1973	New Amber Longberry	26.50	29.50	22.70	29.50	27.05
2008	Mammoth Red	25.30	29.20	25.20	28.20	26.97
3617	Hybrid	21.70	34.67	21.80	27.80	26.49
1981	Dietz[1]	25.20	28.34	21.10	28.20	25.71
3277	Virginia	24.50	35.15	21.00	21.50	25.54
1969	Michigan Amber	28.00	28.83	21.00	21.00	24.71
3614	Hybrid	16.80	30.07	19.20	31.30	24.34
3608	do	21.20	31.67	19.07	25.30	24.31
1974	Martin Amber	21.90	31.50	20.00	23.70	24.27
3616	Hybrid	20.00	29.67	16.10	31.00	24.19
1933	Jones Winter Fife	22.80	24.00	24.70	24.70	24.05
3618	Hybrid	22.50	30.55	20.80	22.20	24.01
1911	Bearded Purple Straw	20.10	28.67	23.20	22.30	23.57
1980	Fultzo-Mediterranean	21.70	28.83	19.20	22.50	23.06
3610	Hybrid	16.70	29.20	22.00	21.00	22.22
3609	do	14.70	32.53	18.01	23.30	22.13
3613	do	12.00	22.27	19.70	31.20	21.29
3611	do	20.70	21.60	15.70	24.70	20.67
3612	do	13.80	20.27	19.50	24.50	19.52

[1] Used as the check; the figures given are the average of the yields from several plats.

TESTS AT NEPHI, UTAH.

Stoner (Miracle) wheat was tested at Nephi, Utah, in 1911, by the United States Department of Agriculture in cooperation with the Utah Agricultural Experiment Station, in one-twentieth acre plats, in comparison with several other varieties. The results are shown in Table VII. In this test of seven varieties, this wheat ranked sixth in yield, producing 26.7 bushels, or 11.4 bushels less than the best yielding variety.

TABLE VII.—*Yield of wheat grown at Nephi, Utah, in 1911 from pedigreed seed of 1910.*

Variety.	C. I. No.	Class.	Yield per acre.
			Bushels.
Odessa	3274–1	Soft winter	38.1
Kharkof	1583–2	Hard winter	31.0
Alberta Red	2979–17	do	29.3
Turkey	2998–1	do	27.7
Do	3055–13	do	27.3
Stoner	2980	Soft winter	26.7
Turkey	1571–2	Hard winter	18.0
Average			28.3

RATE-OF-SEEDING TESTS.

Rate-of-seeding tests have been conducted on the Arlington Farm by the United States Department of Agriculture with the Stoner (Miracle) wheat for three years, it having been first included in these tests in the sowings made in the fall of 1911. In these tests this wheat was compared in the first year with seven other varieties, four of which are well-known sorts commonly grown among farmers. In the two succeeding years it has been compared with three of these well-known sorts. The names of the varieties used and the yields for the different rates of seeding are given in Table VIII, only those varieties being included which have been used throughout the entire 3-year period. In 1912 no seeding of less than 4 pecks per acre was made of any of the varieties. In the succeeding two years seedings of 2, 3, 4, 5, 6, 7, and 8 pecks per acre were made. The plats were one-twentieth of an acre in size in 1912, and the tests were not replicated, but in 1914 the size of the plats was reduced to one-fortieth of an acre, and the sowings were made in duplicate and the results averaged.

These results show that the best yield of Stoner wheat has been obtained by sowing 4 pecks per acre. When 2 pecks were sown in the two years 1913 and 1914, 22.15 bushels were harvested. In these same years 24.5 bushels were harvested from 3 pecks sown and 24.95 from 4 pecks. From sowings of 5, 6, 7, and 8 pecks, less quantities were harvested than from the 3-peck or 4-peck seedings, but in each case more than from the 2-peck seeding. An addition of 2 pecks to the quantity sown has increased the yield over the 2-peck sowing an average of 2.8 bushels per acre for the two years. Including the year 1912 and averaging for only the 4, 5, and 6 peck seedings, the best yield was again obtained by sowing 4 pecks, the yield here, 26.52 bushels, being larger than that secured from sowing either 5 pecks or 6 pecks per acre. Smaller or larger sowings were not made in the year 1912.

TABLE VIII.—*Yield of Stoner (Miracle) wheat and other varieties in comparative rate-of-seeding test at Arlington Farm, Rosslyn, Va.*

Variety and year.	Yield per acre (bushels) at different rates of seeding.						
	2 pecks.	3 pecks.	4 pecks.	5 pecks.	6 pecks.	7 pecks.	8 pecks.
Stoner (Miracle):							
1912	.....	.....	29.67	32.22	30.17	.....	.....
1913	17.40	18.30	17.10	17.50	14.70	14.50	16.00
1914	26.90	30.70	32.80	28.90	29.70	30.90	29.80
Average 1913–14	22.15	24.50	24.95	23.20	22.20	22.70	22.90
Average 1912–14	.....	.....	26.52	26.21	24.86	.....	.....
Dietz:							
1912	.....	.....	28.00	24.50	22.67	.....	.....
1913	18.90	19.90	16.80	18.70	19.40	17.40	19.70
1914	26.70	30.00	29.50	27.80	29.70	30.60	32.50
Average 1913–14	22.80	24.95	23.15	23.25	24.55	24.00	26.10
Average 1912–14	.....	.....	24.77	23.67	23.93	.....	.....
Fultz:							
1912	.....	.....	32.55	32.42	31.22	.....	.....
1913	19.10	22.70	24.70	24.60	24.00	21.30	24.80
1914	29.70	33.00	39.00	37.70	36.20	37.40	37.90
Average 1913–14	24.40	27.85	31.85	31.15	30.10	29.35	31.35
Average 1912–14	.....	.....	32.08	31.57	30.47	.....	.....
Martin Amber:							
1912	.....	.....	34.92	31.83	28.83	.....	.....
1913	18.40	19.70	19.00	17.20	17.40	12.40	14.70
1914	22.60	27.00	26.00	24.90	27.80	25.60	23.90
Average 1913–14	20.50	23.35	22.50	21.05	22.60	19.00	19.30
Average 1912–14	.....	.....	26.64	24.64	24.68	.....	.....
Average of all:							
Average 1913–14	22.46	25.16	25.61	24.66	24.86	23.76	24.91
Average 1912–14	.....	.....	27.50	26.52	25.98	.....	.....

When these results are compared with those for the other varieties used, it is seen that as an average for the two years 1913 and 1914 the largest gross yields were obtained from sowing 8 pecks of Dietz, 4 pecks of Fultz, and 3 pecks of Martin Amber. On account of the larger quantity of seed used in sowing 8 pecks, the largest net return from the Dietz was from the 3-peck seeding. The largest net returns from the other varieties were from the same seedings mentioned above. Including the year 1912 and averaging for only the 4, 5, and 6 peck seedings, the largest net and gross returns were obtained for the three years 1912–1914 in every case from the smallest quantity; that is, from the 4-peck seeding.

When all varieties are averaged both for the two years, 1913–1914, and for the years, 1912–1914, the best gross and net yields were obtained from the 4-peck seeding. The 4-peck seeding yielded 0.45 bushel more than the 3-peck and 3.15 bushels more than the 2-peck seeding.

It must be concluded that Stoner wheat does not differ from the other varieties tested in requiring less seed per acre, and also that 2 pecks are not sufficient from which to obtain maximum yields.

It should be said in connection with these tests that these wheats were drilled in fertile soil in a well-prepared seed bed. More seed

of all these varieties would probably be required where conditions are not so favorable.

TILLERING POWER OF STONER (MIRACLE) WHEAT.

Tests to determine the tillering power of Stoner (Miracle) wheat were made at Arlington Farm by sowing, in both 1912 and 1913, individual kernels of this variety and of three standard varieties, each kernel being given plenty of room for maximum development. These kernels were sown 6 inches apart in rows 1 foot apart and 5 feet long, in uniform soil, the order of sowing being that given in Table IX. All varieties were grown under identical conditions on small adjacent plats of land.

TABLE IX.—*Tillering power of Stoner (Miracle) wheat in comparison with other varieties at Arlington Farm, Rosslyn, Va.*

Number of heads per plant.	Number of plants, crop of 1913.				Number of plants, crop of 1914.			
	Fultz.	Dietz.	Stoner.	Martin Amber.	Fultz.	Dietz.	Stoner.	Martin Amber.
1	.....	.....	2	1	1	.....	1	.....
2	.....	.....	.....	1	.....	.....	1	.....
3	2	1	1	5	.....	.....	2	.....
4	1	3	4	3	2	1	3	.....
5	2	3	2	1	5	3	2	.....
6	6	4	6	3	4	1	4	1
7	1	3	4	4	7	6	8	2
8	5	2	1	1	12	11	6	5
9	3	1	4	3	11	11	20	9
10	6	3	4	3	10	10	12	16
11	8	3	2	5	14	13	11	9
12	5	3	4	3	16	17	5	7
13	6	7	1	1	3	14	6	19
14	4	4	2	3	4	2	6	4
15	4	1	.....	2	2	3	2	5
16	2	1	2	.....	2	.....	2	4
17	.....	1	.....	1	1	1	1	5
18	1	.....	2	.....	1	.....	.....	2
19	1	1	.....	.....	1	.....	.....	1
20	.....	.....	.....	.....	1	1	.....	1
21	.....	1	.....	.....	.....	.....	.....	1
31	.....	.....	.....	1	.....	.....	.....	.....
Total plants	57	42	41	41	97	94	92	91
Average number of culms per plant	10.5	10.3	8.7	9.0	10.1	10.4	9.6	12.2

Table IX shows that in 1913 the 41 plants of Stoner wheat produced an average of 8.7 culms to the plant. This is the smallest number produced by the plants of any of the varieties used, Martin Amber producing 9 culms, Dietz 10.3, and Fultz 10.5.

The results for 1914 are similar to those of the previous year in this respect, that the plants of Stoner wheat again produced the smallest average number of culms, there being in this year 9.6 to the plant of this variety. Fultz produced 10.1, Dietz 10.4, and Martin Amber 12.2. The tests for these two years indicate, then, that Stoner is the poorest of these four wheats in tillering power. These results also show that in neither year was there a larger number of culms than 18 produced by any plant of the Stoner wheat, while there is a total of ten plants of the other varieties in the two years which produced more than 18 culms each.

Similar tests to determine the tillering power of Stoner (Miracle) wheat were conducted in the years 1909, 1911, and 1912 at Nephi, Utah, by the United States Department of Agriculture in cooperation with the Utah Agricultural Experiment Station. The sowing was in head rows 10 feet long and 1 foot apart, the seeds being placed 4 inches apart in the row. The results are shown in Table X.

The average number of culms produced by the plants of this wheat in the three years is 11. It is third in rank among the nine varieties tested for all or part of the time, but it produced eight culms less than the best tillering variety, the Turkey, which produced an average of 19 culms per plant for the three years. In no year was the Stoner wheat highest in culms produced. In yield this wheat ranks third as an average for all varieties tested for the three years. A yield test in head rows, however, is inclusive. Yield tests in one-twentieth acre plats at Nephi have been previously reported.

TABLE X.—*Tillering power and yield of Stoner (Miracle) wheat and eight other wheats at Nephi, Utah, in the years 1909, 1911, and 1912.*

C. I. No.	Variety.	Class.	Average number of heads per plant.				Yield per row (grams).			
			1909	1911	1912	Average.	1909	1911	1912	Average.
3055–13	Turkey	Hard red winter	13	25	18	19	210	181	148	180
2997–5	Koffold	Soft white winter	9	16	10	12	253	265	157	225
2996–2	Gold Coin	do	7	16	7	10	191	165	129	162
2980	Miracle	Semihard red winter.	7	16	11	11	213	186	116	172
	Alaska	Soft white winter (or spring).	3	.....	.....	3	47	.....	.....	47
2100	Black Don	Durum	5	5	.....	5	56	25	.....	41
3001–1	Silver Club	Soft winter club	7	.....	.....	7	211	.....	.....	211
2398–1	Galgalos	Soft white spring	6	.....	.....	6	144	.....	.....	144
2934–1	Durum	Durum	4	3	3	3	.....	.....	.....	.....
Average			6.8	13.5	9.8	8.2	165.6	164.4	137.5	147.7

GENERAL TESTS BY STATE EXPERIMENT STATIONS.

TESTS IN KENTUCKY.

The following results of tests of Miracle wheat made at the Kentucky Agricultural Experiment Station are published in Bulletin 155 of that station:

Seed sown per acre.	Yield per acre in 1911.	
	Miracle.	Harvest King.
	Bushels.	*Bushels.*
2 pecks	31.3	.....
3 pecks	32.7	.....
4 pecks	34.7	35.0
5 pecks	35.3	35.0
6 pecks	36.7	34.7
7 pecks	.....	36.3
8 pecks	.....	25.0

The party furnishing Miracle wheat recommended 2 pecks per acre, claiming great stooling power for it.

Subsequent results obtained at the Kentucky station are given in the letter below from E. J. Kinney, assistant agronomist of that station:

I beg to say that we did not continue the experiments recorded in 1911 in Bulletin 155 any longer than the one year. The Miracle wheat showed no greater propensities for stooling than any of the standard varieties of wheat, and there seemed no necessity for carrying the experiment any farther. So far as moisture was concerned, 1911 was a very normal season; in fact, better than a normal season, according to my records, so that the thinner sown wheat had the best opportunity to stool.

In 1912 Miracle wheat yielded only 22.5 bushels, as compared with 28.1 bushels for Fulcaster and an average of 30 bushels for a standard Fultz variety; 1912 was a very hard winter, and only the hardiest varieties of wheat came through in good shape.

In 1913 Miracle yielded 28.7 bushels per acre, or a corrected yield according to check plats of 32 bushels, as compared with an average of the check plats of 32.8. Fulcaster the same year gave a corrected yield of 33.9 bushels per acre.

In 1914 Miracle gave a corrected yield of 26.76 bushels, as compared with an average check-plat yield, which was Fultz, of 32.98 bushels per acre. In all these cases, the crops were planted at the same time, in the same field, with the same preparation of soil and the same rate of seeding.

In 1914 a farmer brought in a variety of wheat which he said was sold to him as Marvelous, and which I imagined and still believe is the same as Miracle. It was reported as giving a full yield with a light seeding; say, 2 pecks. I planted a plat of this at the rate of 6 pecks per acre and one at the rate of 2 pecks per acre, the corrected yield being 31.17 bushels for the 6 pecks per acre rate of seeding and 24.46 for the 2 pecks rate of seeding.

I do not see that Miracle or Marvelous stooled any more than a standard variety of wheat, such as Fulcaster or other varieties. Certainly, in all cases where we have tested these varieties with the proclaimed stooling characters, the thicker seeding has given decidedly the heavier yield.

TESTS IN PENNSYLVANIA.

The Pennsylvania Agricultural Experiment Station sowed the Stoner (Miracle) wheat at two rates in the fall of 1912. The yields in 1913 are given in Bulletin 125 of that station, and are as follows:

Stoner (Miracle) wheat.	Actual yield.		Corrected yield.	
	Grain.	Straw.	Grain.	Straw.
Seeded at—	*Bushels.*	*Pounds.*	*Bushels.*	*Pounds.*
2 bushels per acre	33.6	4,665	30.8	4,473
1 bushel per acre	28.6	3,350	25.5	3,419

The increased yield of 5 bushels resulting from the sowing of 1 bushel more of seed is certainly worth the increased expense for seed.

Regarding subsequent tests made of this variety by the Pennsylvania Agricultural Experiment Station, the following extract from a letter received from Charles F. Noll, assistant professor of experimental agronomy, is self-explanatory:

Replying to your letter of May 28 in regard to Miracle wheat, we seeded this variety in 1914 only at the rate of 2 bushels per acre, which is our usual rate of seeding the variety testing plats. I have averaged the yields of our named varieties for the years 1913–14, and find that Miracle gave us a yield of 32.5 bushels of grain and 3,772 pounds of straw per acre. In yield of grain for these two years, it has ranked eighth, and fifth in yield of straw. For our conditions it is a good variety of wheat, but there is nothing remarkable about its productiveness or its tillering.

TESTS IN INDIANA.

The Miracle wheat under the name of Marvelous has been tested by the Indiana Agricultural Experiment Station at Lafayette, Ind., and the results secured are given in the following extract from a letter from C. O. Cromer, associate in crops at that place:

Last year (1914) was the only year in which we have secured any data on this wheat (Marvelous). The other years that we sowed it the winter was too severe for it. In looking up our records I find that in comparison with the Michigan Amber, the variety which we have used as our check for a number of years, the Marvelous wheat stands as follows: The Michigan Amber at 3 pecks per acre produced 10.9 bushels. The Marvelous produced 4.8 bushels. The Michigan Amber at 6 pecks per acre produced practically the same as the Michigan Amber at 3 pecks, while the Marvelous at 6 pecks produced 5.5 bushels. The spring survival of the Michigan Amber was 85 per cent; that of the Marvelous was 45 per cent. A much larger percentage of the Marvelous wheat lodged than was true of the Michigan Amber. The straw of the Marvelous is a little stiffer, however, as a rule. The Michigan Amber, according to our data of last year, was on the average 4 inches taller than the Marvelous wheat and ripened two days earlier.

CONCLUSIONS.

The reader should remember these facts about the branch-headed wheat known as Alaska, Seven-Headed, Mummy, Egyptian, or by some other name: (1) That it has been used in this country very often as a means of deceiving people and very seldom as a farm crop; (2) that it has failed to produce even fair yields when tried in many parts of the country, and has never been known to produce extraordinary yields; (3) that it is not as good a milling wheat as many other widely-grown varieties, some of which are much better adapted to any given location; (4) that the branched head is not a sign of superior yielding power.

Stoner wheat does not differ essentially in value from many other wheats now being widely grown in the eastern half of the United States. It is not as good as some and is somewhat better than others. The class of wheat (soft red winter) to which it belongs is adapted

to the eastern United States, but the variety itself is only of average value. It is not adapted to dry lands.

The claims made by the originator of Stoner (Miracle) wheat and by those who have exploited it are not substantiated by the experimental results reported above.

It was claimed that it would outyield any other variety anywhere. In the tests it has never outyielded anywhere all other varieties with which compared, and many other varieties have surpassed it in yield.

It was claimed that it tillered more freely than other varieties. The tests show that other commonly grown varieties have exceeded it in number of culms to the plant produced wherever grown in comparative tests.

It was claimed that 20 or 30 pounds of seed per acre were sufficient for maximum yields. The tests show that better yields are obtained from it when sown at higher rates to the acre.

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